## REMARKS

By the present amendment and response, independent claims 10, 14, 18 and 26 and dependent claims 20, 24, 28, and 31 have been amended to overcome the Examiner's objections and claims 19, 25, 27, and 32 have been canceled. Thus, claims 1-10, 14-18, 20-24, 26, and 28-31 are pending in the present application. Claims 1-9 have been allowed. Reconsideration and allowance of pending claims 10, 14-18, 20-24, 26, and 28-31 in view of the following remarks are requested.

The Examiner has rejected claims 18 and 26 under 35 USC §112, first paragraph. Applicant has amended claims 18 and 26 in response to the Examiner's objection and submits that the requirements of 35 USC §112, first paragraph, have been met.

The Examiner has further rejected claims 18 and 26 under 35 USC §112, second paragraph. Applicant has amended claims 18 and 26 in response to the Examiner's objection and submits that the requirements of 35 USC §112, second paragraph, have been met.

The Examiner has further rejected claims 26-28 under 35 USC §102(e) as being anticipated by U.S. patent number 6,030,541 to Adkisson et al. ("Adkisson"). For the reasons discussed below, Applicant respectfully submits that the present invention, as defined by amended independent claim 26, is patentably distinguishable over Adkisson. However, Applicant reserves the right to provide declarations and/or documents under 37 CFR §1.131 to "swear behind" the effective filing date of Adkisson.

Subject to Applicant's reserved right to establish priority of the present invention under 37 CFR §1.131, Applicant submits that the present invention, as defined by amended independent claim 26, teaches, among other things, "pattern etching the layer of silicon oxynitride and the layer of polycrystalline silicon to form a stack," and "removing the layer of silicon oxynitride before subjecting the layer of silicon oxynitride to a temperature greater than about 400°C after the step of depositing the layer of silicon oxynitride." As disclosed in the present application, if the stack has been re-oxidized after the layer of polycrystalline silicon has been etched, as is a routine practice in many MOS process technologies, the etch rate of the silicon oxynitride during subsequent removal of the silicon oxynitride is undesirably low. Also, the re-oxidizing step in a conventional process is typically performed at a temperature exceeding 400°C. Thus, by ensuring that the layer of silicon oxynitride is not subjected to a temperature greater than about 400°C after it has been depositing, the layer of silicon oxynitride can be effectively removed at an etch rate in hot phosphoric acid of about 6nm per minute utilizing the present invention. As a result, the layer of silicon oxynitride can be effectively removed without deleteriously etching the exposed edge of silicon nitride included in the stack.

In contrast, Adkisson does not teach, disclose, or suggest "pattern etching the layer of silicon oxynitride and the layer of polycrystalline silicon to form a stack," and "removing the layer of silicon oxynitride before subjecting the layer of silicon oxynitride to a temperature greater than about 400°C after the step of depositing the layer of silicon oxynitride." Adkisson specifically discloses removing anti-reflective coating 16 before

etching the underlying polysilicon film to avoid disrupting the poly gate structure material. See, for example, Adkisson, column 5, lines 36-54. Additionally, Adkisson does not teach, disclose, or suggest ensuring that anti-reflective coating 16 is removed without subjecting anti-reflective coating 16 to a temperature greater than about 400°C after it (i.e. anti-reflective coating 16) has been deposited. In fact, Adkisson does not mention a need or desire to observe or follow any temperature restrictions on processes occurring after deposition and prior to removal of anti-reflective coating 16.

For the foregoing reasons, Applicant respectfully submits that the present invention, as defined by amended independent claim 26, is not suggested, disclosed, or taught by Adkisson. As such, the present invention, as defined by amended independent claim 26, is patentably distinguishable over Adkisson. Thus claims 28-31 depending from amended independent claim 26 are, *a fortiori*, also patentably distinguishable over Adkisson for at least the reasons presented above and also for additional limitations contained in each dependent claim.

The Examiner has further rejected claims 10, 14, and 32 under 35 USC §103(a) as being unpatentable over Adkisson and "Silicon Processing for the VLSI Era Volume 1: Process Technology," pp. 429-455 and 518, by Wolf et al. ("Wolf"). For the reasons discussed below, Applicant respectfully submits that the present invention, as defined by amended independent claims 10 and 14, is patentably distinguishable over Adkisson and Wolf.

The present invention, as defined by amended independent claim 10, teaches, among other things, "pattern etching the layer of silicon oxynitride and the layer of polycrystalline silicon," and etching the remaining layer of silicon oxynitride in a phosphoric acid etchant without subjecting the layer of silicon oxynitride to any temperature greater than about 400°C after the step of depositing the layer of silicon oxynitride." By etching the layer of silicon oxynitride in a phosphoric acid etchant without subjecting the layer of silicon oxynitride to any temperature greater than about 400°C after the step of depositing the layer of silicon oxynitride, the present invention, as defined by amended independent claim 10, achieves the same advantages as discussed above.

In contrast, as discussed above, Adkisson discloses removing anti-reflective coating 16 before etching the underlying polysilicon film to avoid disrupting the poly gate structure material. Additionally, as discussed above, Adkisson does not teach, disclose, or suggest ensuring that anti-reflective coating 16 is removed without subjecting anti-reflective coating 16 to a temperature greater than about 400°C after it (i.e. anti-reflective coating 16) has been deposited.

In contrast, Wolf does not teach, disclose, or suggest The present invention, as defined by independent claim 10, teaches, among other things, "pattern etching the layer of silicon oxynitride and the layer of polycrystalline silicon," and etching the remaining layer of silicon oxynitride in a phosphoric acid etchant without subjecting the layer of silicon oxynitride to any temperature greater than about 400°C after the step of depositing

the layer of silicon oxynitride." The Examiner has cited Wolf to show that the processing of photoresist is performed utilizing a temperature that is less than 400ºC. Thus, the present invention, as defined by amended independent claim 10 as set forth above, is patentably distinguishable from Adkisson, either singly, or in combination with Wolf.

Also, the present invention, as defined by amended independent claim 14, teaches, among other things, pattern etching a first layer, a second layer comprising silicon oxynitride, and a layer of polycrystalline silicon, and "etching the second layer in an etchant comprising hot phosphoric acid, the etching occurring before the second layer is subjected to any temperature greater than about 400°C." Similarly, for the reasons discussed above, the present invention as defined by amended independent claim 14 is not suggested, disclosed, or taught by Adkisson, either singly, or in combination with Wolf. Thus, the present invention, as defined by amended independent claim 14, is patentably distinguishable from Adkisson, either singly, or in combination with Wolf. As such, claims 15-17 depending from independent claim 14 are, *a fortiori*, also patentably distinguishable over Adkisson and Wolf for at least the reasons presented above and also for additional limitations contained in each dependent claim.

The Examiner has further rejected claims 18, 19, 23, and 25 under 35 USC §103(a) as being unpatentable over Adkisson and further in view of U.S. patent no. 5,620,913 to Hsiao-Lun Lee ("Lee"). For the reasons discussed below, Applicant respectfully submits that the present invention, as defined by amended independent claim 18, is patentably distinguishable over Adkisson and Lee.

The present invention, as defined by amended independent claim 18, teaches, among other things, "depositing a layer of oxynitride above the second polycrystalline silicon layer," "pattern etching the device to form a stack," and "removing the layer of silicon oxynitride without subjecting the layer of silicon oxynitride to a temperature greater than about 400°C after the step of depositing the layer of silicon oxynitride." The present invention, as defined by amended independent claim 18, achieves the same advantages as discussed above.

In contrast, as discussed above, Adkisson does not teach, disclose, or suggest "depositing a layer of oxynitride above the second polycrystalline silicon layer," "pattern etching the device to form a stack," and "removing the layer of silicon oxynitride without subjecting the layer of silicon oxynitride to a temperature greater than about 400°C after the step of depositing the layer of silicon oxynitride." Also, Lee does not teach, disclose, or suggest "depositing a layer of oxynitride above the second polycrystalline silicon layer," "pattern etching the device to form a stack," and "removing the layer of silicon oxynitride without subjecting the layer of silicon oxynitride to a temperature greater than about 400°C after the step of depositing the layer of silicon oxynitride." In fact, Lee does not teach, disclose, or suggest utilizing an anti-reflective coating. For similar reasons as discussed above, the present invention as defined by amended independent claim 18, is not suggested, disclosed, or taught by Adkisson, either singly, or in combination with Lee.

Thus, the present invention, as defined by amended independent claim 18, is patentably distinguishable from Adkisson, either singly, or in combination with Lee. As

such, claims 20-24 depending from amended independent claim 18 are, *a fortiori*, also patentably distinguishable over Adkisson and Lee for at least the reasons presented above and also for additional limitations contained in each dependent claim.

The Examiner has further rejected claims 15-17, 20-22, and 29-30 under 35 USC §103(a) as being unpatentable over Adkisson, Adkisson/Wolf, or Adkisson/Lee as applied to claims 14, 19, and 27, and further in view of U.S. patent number 5,968,324 to Cheung et al. As discussed above, amended independent claim 14 is patentable distinguishable over Adkisson and Wolf, amended independent claim 18 is patentably distinguishable over Adkisson and Lee, and amended independent claim 26 is patentably distinguishable over Adkisson. As such, claim 15-17 depending from amended independent claim 14 are, *a fortiori*, also patentably distinguishable over Adkisson and Wolf for at least the reasons presented above and also for additional limitations contained in each dependent claim. Also, claims 20-22 depending from amended independent claim 18 are, *a fortiori*, also patentably distinguishable over Adkisson and Lee and claims 29-30 depending from amended independent claim 26 are, *a fortiori*, also patentably distinguishable over Adkisson.

The Examiner has further rejected claims 24 and 31 under 35 USC §103(a) as being unpatentable over Adkisson or Adkisson/Lee as applied to claims 18 and 26, and further in view of U.S. patent number 6,245,682 to Fu et al. As discussed above, amended independent claim 18 is patentably distinguishable over Adkisson and Lee and amended independent claim 26 is patentably distinguishable over Adkisson. As such,

claim 23 depending from amended independent claim 18 is, *a fortiori*, also patentably distinguishable over Adkisson and Lee and claim 31 depending from amended independent claim 26 is, *a fortiori*, also patentably distinguishable over Adkisson.

Based on the foregoing reasons, the present invention, as defined by amended independent claims 10, 14, 18, and 26 and claims depending therefrom, is patentably distinguishable over the art cited by the Examiner. Thus, claims 10, 14-18, 20-24, 26, and 28-31 are also patentably distinguishable over the art cited by the Examiner. For all the foregoing reasons, an early allowance of outstanding claims 10, 14-18, 20-24, 26, and 28-31 and an early Notice of Allowance for all pending claims 1-10, 14-18, 20-24, 26, and 28-31 is respectfully requested.

Respectfully Submitted,
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VERSION WITH MARKINGS TO SHOW CHANGES MADE

**In the Claims**:

**Claims 10, 14, and 18 have been amended as follows:**

10. (Once Amended) A process for etching silicon oxynitride which comprises the steps of:

depositing a layer of polycrystalline silicon overlying a substrate;

depositing a layer of silicon oxynitride overlying [a substrate] the layer of polycrystalline silicon;

[forming an etch resistant pattern overlying the silicon oxynitride; and]

pattern etching the layer of silicon oxynitride and the layer of polycrystalline silicon; and

etching the remaining layer of silicon oxynitride in a phosphoric acid etchant without subjecting the layer of silicon oxynitride to any temperature greater than about 400°C after the step of depositing the layer of silicon oxynitride [between the steps of depositing and etching].

14. (Once Amended) A process for fabricating a semiconductor device comprising the steps of:

depositing a layer of polycrystalline silicon overlying a substrate;

depositing a first layer of oxide to a thickness of between about 7.5nm and 10nm by chemical vapor deposition from a TEOS source overlying the layer of polycrystalline silicon;

depositing a second layer of silicon oxynitride overlying the first layer to a thickness of between about 25nm and about 30nm by plasma enhanced chemical vapor deposition;

pattern etching [patterning] the first and second layers and the layer of polycrystalline silicon; and

etching the second layer in an etchant comprising hot phosphoric acid, the etching occurring before the second layer is subjected to any temperature greater than about 400°C.

18. (Thrice Amended) A process comprising:

providing a semiconductor substrate;

forming a gate oxide above the semiconductor substrate;

forming a first polycrystalline silicon layer over the gate oxide;

forming an interpoly dielectric;

forming a second polycrystalline silicon layer over the interpoly dielectric;

depositing [forming] a layer of silicon oxynitride [an anti-reflective coating] above the second polycrystalline silicon layer;

pattern etching [patterning] the device to form a stack; and

removing the layer of silicon oxynitride [anti-reflective coating] without subjecting the layer of silicon oxynitride to a temperature greater than about 400°C after the step of depositing the layer of silicon oxynitride [without applying an oxide after the formation of the anti-reflective coating].

**Claim 19 has been canceled.**

**Claims 20 and 24 have been amended as follows:**

20. (Once Amended) The process of claim 18 [19], wherein the layer of silicon oxynitride is deposited by a plasma enhanced chemical vapor deposition process using the reactants $N_2O$ and $SiH_4$.

24. (Once Amended) The process of claim 18, wherein the removing of the layer of silicon oxynitride [antireflective coating] comprises the step of etching with hot phosphoric acid.

**Claim 25 has been canceled.**

**Claim 26 has been amended as follows:**

26. (Twice Amended) A process comprising:

depositing a layer of polycrystalline silicon over [providing] a substrate;

depositing [forming] a layer of silicon oxynitride [an anti-reflective coating] above the layer of polycrystalline silicon [substrate];

pattern etching [patterning the substrate] the layer of silicon oxynitride and the layer of polycrystalline silicon to form a stack; and

removing the layer of silicon oxynitride before subjecting the layer of silicon oxynitride to a temperature greater than about 400°C after the step of depositing the layer of silicon oxynitride [anti-reflective coating without applying an oxide after the formation of the anti-reflective coating].

**Claim 27 has been canceled.**

**Claims 28 and 31 have been amended as follows:**

28. (Once Amended) The process of claim 26 [27], wherein the layer of silicon oxynitride is deposited by a plasma enhanced chemical vapor deposition process using the reactants $N_2O$ and $SiH_4$.

31. (Once Amended) The process of claim 26, wherein the removing of the layer of silicon oxynitride [antireflective coating] comprises the step of etching with hot phosphoric acid.

**Claim 32 has been canceled.**